ASSESSING AND MANAGING SOCIAL RISKS ON LARGE WILDFIRES

TODDI STEELMAN AND BRANDA NOWELL

UNIVERSITY OF SASKATCHEWAN, SCHOOL OF ENVIRONMENT AND SUSTAINABILITY, TODDI.STEELMAN@USASK.CA

FIRE CHASERS PROJECT
Advancing the science of adaptive capacity toward more disaster resilient communities

Wildfire Canada, Thursday October 27, 2016
Ft. McMurray
Rising expectations about who will be involved in a complex wildfire incident

Cohesive strategy goals—
- Efficient and effective response to shared-jurisdiction wildfire
- Pre-fire planning for multiple jurisdictions
- Metrics include pre-season agreements and annual operating plans, integrated wildfire response scenarios, and shared training

More holistic and system focus regarding both WHO we consider part of incident response and WHAT we consider as part of incident response
WHY IS A NETWORK PERSPECTIVE VALUABLE FOR UNDERSTANDING COMPLEX FIRE EVENTS?
Fire management
Fire management

Road Closures
Fire management
Evacuations
Road Closures
Sheltering & Mass Care
Fire management

Interagency Communications

Public Information

Evacuations

Sheltering & Mass Care

Cost Share
SIGNIFICANT INTERDEPENDENCE EXISTS ACROSS OPERATIONAL DOMAINS

- Fire management
- Public Information
- Evacuations
- Resource Protection
- Road Closures
- Utility Restoration
- Structure Protection
- Sheltering & Mass Care
DIFFERENT DOMAINS ARE UNDER THE JURISDICTION AND RESPONSIBILITY OF DIFFERENT ACTORS

Fire management
Public Information
Evacuations
Resource Protection
Road Closures
Utility Restoration
Structure Protection
Sheltering & Mass Care
DIFFERENT DOMAINS ARE UNDER THE JURISDICTION AND RESPONSIBILITY OF DIFFERENT ACTORS

- Public Information
- Fire management
- Structure Protection
- Resource Protection
- Road Closures
- Evacuations
- Utility Restoration
- Sheltering & Mass Care
RESEARCH QUESTIONS

- Phase 1: Is there an ideal structure of an incident response network?
- Phase 2: How do we conceptualize and measure performance within an incident response network?
EXPLORING IDEAL NETWORK STRUCTURE: METHODS

- 25 Type 1 All Hazard incident commanders and deputy incident commanders associated with incident management teams (2011, 2012)
  - social network roster
  - who needed to be in active communication with whom for an incident to be managed effectively

- Aggregated model
  - only ties nominated as critical by 75% or more of respondents
  - member checked with the Type 1 incident commanders in 2012
NETWORK COGNITION: WILDFIRE NETWORK (75% AGREEMENT BY ICS)
NETWORK COGNITION: WILDFIRE NETWORK (75% AGREEMENT BY ICS)
NETWORK COGNITION: CORE AND PERIPHERY

[Network diagram showing connections and categories related to core and periphery in a network context.]
NETWORK COGNITION: CORE AND PERIPHERY
NETWORK COGNITION: CORE AND PERIPHERY
NETWORK COGNITION: CORE AND PERIPHERY

[Network diagram showing various nodes and connections]
**Analysis revealed:**

1. A core-periphery network structure
2. Network grouped into five major functional areas: fire operations, local government/elected officials, disaster response operations, and public information
3. Each functional area was linked to the core through a network broker
4. Significant ambiguity about the position of several actors

Creates opportunity for greater situational awareness on incidents with complex social interactions
INCIDENT PERFORMANCE FOR FIRE SEASON 2013: HOW DID WE DO?

- Type 1 and Type 2 WUI Fires
- ID, OR, WA, and MT (+ one pilot in CO)
- Total of 22 incidents
- Network Performance scale (Nowell & Steelman, 2012)
  - 28 items
- Interview and observation data from three incidents:
  - GC Complex (OR), Elk (ID), and Beaver Creek (ID) fires
RESULTS:
MEASURE 1: OPERATIONAL DOMAINS

- Public information
- Re-entry of evacuated areas
- Road closures
- Evacuation and Sheltering
- Interagency communication
- Fire operations
- Cost Share mgmt
We see stronger performance in areas of the network where ICS is prevalent and IMT has formal control.
SOCIAL RISK ASSESSMENT AND MANAGEMENT: TOOLS YOU CAN USE

- Watch Out Situations

- SOCIAL WATCH OUTS

18 WATCH OUT SITUATIONS

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior.
5. Uninformed on strategy, tactics, and hazards.
6. Instructions and assignments not clear.
7. No communication link with crew members/supervisor.
8. Constructing fireline without safe anchor point.
9. Building fireline downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather is getting hotter and drier.
15. Wind increases and/or changes direction.
17. Terrain and fuels make escape to safety zones difficult
18. Taking a nap near the fireline.

10 STANDARD FIREFIGHTING ORDERS

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of the fire.
4. Identify escape routes and safety zones, and make them known.
5. Post lookouts when there is possible danger.
7. Maintain prompt communications with your forces, your supervisor, and adjoining forces.
8. Give clear instructions and ensure they are understood.
9. Maintain control of your forces at all times.
10. Fight fire aggressively, having provided for safety first.
Methods: Data Collection

• Create initial list of social watch out situations
  - Key informant Interviews 2012/2013
  - 24 fire managers representing 646 years of experience
• Refine and develop list
  - 2013 Area Commanders & Incident Commanders Annual Workshop
  - Field Observations
• Classify into most challenging & encountered
  - 2014 Area Commanders & Incident Commanders Annual Workshop
# Findings: Most Challenging

<table>
<thead>
<tr>
<th>Social Watch Out Situation</th>
<th>% of IC Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incident resulted in loss of structures, working lands, or other critical values at risk</td>
<td>94%</td>
</tr>
<tr>
<td>Actions indicated hidden or unspoken agendas on part of local cooperators</td>
<td>89%</td>
</tr>
<tr>
<td>Fire threatened a greater than average number of community assets</td>
<td>86%</td>
</tr>
<tr>
<td>Fire occurred during time when national resources were heavily committed (PL4 or PL5)</td>
<td>86%</td>
</tr>
</tbody>
</table>
# Findings: Most Challenging

<table>
<thead>
<tr>
<th>Social Watch Out Situation</th>
<th>% of IC Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problematic historic relationships between host Forest and local community</td>
<td>83%</td>
</tr>
<tr>
<td>Anti-fed/outsider/government sentiment was present in the community</td>
<td>83%</td>
</tr>
<tr>
<td>Apparent conflicts or turf battles between or among local cooperators and/or host forest</td>
<td>81%</td>
</tr>
<tr>
<td>Incident was of significant local political interest</td>
<td>81%</td>
</tr>
<tr>
<td>Community fatigue was high due to extended duration of incident</td>
<td>81%</td>
</tr>
</tbody>
</table>
Findings: Most Challenging

<table>
<thead>
<tr>
<th>Social Watch Out Situation</th>
<th>% of IC Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A serious injury or fatality occurred on the incident</td>
<td>78%</td>
</tr>
<tr>
<td>Incident was of significant statewide political interest</td>
<td>75%</td>
</tr>
<tr>
<td>There were confusing or conflicting management objectives among agencies involved in managing the fire</td>
<td>75%</td>
</tr>
</tbody>
</table>
Community fatigue was high due to extended duration of incident.

Actions indicated hidden or unspoken agendas.

Problematic historic relationships.

Anti-fed/outsider/government sentiment.

Apparent conflicts or turf battles.
Top 5 Most Encountered Watch Outs

1. Incident was of significant statewide political interest (i.e., a state challenge)
2. National resources were heavily committed (PL4 or PL5)
3. Loss of structures, working lands or other critical values at risk
4. Incident was of significant local political interest
5. Fire threatened a greater than average number of community assets

[Bar chart showing the frequency of each watch out with 'challenge' in blue and 'common' in orange.]
Discussion

• IMTs may need to pay special attention to relationship-oriented watch out situations they encounter, because:
  – they can significantly undermine effective communication & coordination
  – they are notoriously difficult to manage
  – their team may have less experience and consequently fewer management tools
Discussion

• Empirical basis for establishing a common set of most challenging and encountered social watch out situations

• Insight into these common areas can lead to more systematic management of these situations

• Use of this metacognitive framework
  – Helpful to identify these potential situational hazards
  – Useful training tools for the next generation of IMTs
Implications

• Better safety outcomes
  – Greater situational awareness can enhance management and safety

• Training tools need to be expanded to include these kinds of tools
Importance of developing broader situational awareness of incident response networks

Network maps are tools for understanding complex incidents

Utilizing metrics for performance on incidents that tap into management of networks and mitigation of social risk through pro-active communication and coordination

ICS tasks are performed better than non-ICS tasks

Watch out for Watch out situations!

Sensitize IMTs to challenging management situations
This project is directed by

- Branda Nowell, Ph.D. (Principal Investigator)
- Toddi Steelman, Ph.D. (Principal Investigator)

Research Funding Provided by:

This research is part of a larger initiative funded by the National Science Foundation, Joint Fire Science Program, and the USFS Northern Research Station. All views and conclusions in this document are those of the authors and should not be interpreted as representing the opinions or politics of the US Government. Mention of trade names or commercial products does not constitute their endorsement by the US Government.
Fire Chasers!

- For more information, visit: [www.firechasers.ncsu.edu](http://www.firechasers.ncsu.edu)

- Tools

- Videos
  - [social watchout situations](http://youtu.be/bGQkEJ4XfHU)
  - [network performance and measurement](http://youtu.be/_UEppQogFho)